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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,902	11/13/2006	James M. Tour	11321-P079WOUS	2103
61060	7590	12/09/2008	EXAMINER	
WINSTEAD PC P.O. BOX 50784 DALLAS, TX 75201			SAHA, BIJAY S	
			ART UNIT	PAPER NUMBER
			4181	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/573,902	Applicant(s) TOUR ET AL.	
	Examiner BIJAY SAHA	Art Unit 4181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>8/23/2007</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Status of Application

The claims **1-14** are pending and presented for the examination.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 8, 10, 12-14 are rejected under 35 U.S.C. 102(b) as being unpatentable by Tour et al WO/2002/060812 08/08/2002 (hereafter WO '812).

Regarding **claim 1**, WO '812 discloses dispersing the functionalized plurality of carbon nanotubes in a solvent (Claim 2) and derivatized carbon nanotubes are thermally defunctionalized by heating and functional moieties removed from the derivatized carbon nanotubes (Claims 28 and 30) yielding a defunctionalized product.

Regarding **claim 2**, WO '812 discloses single wall carbon nano tubes and assembly of carbon nano tubes (Page 2).

Regarding **claim 3**, thermal defunctionalization process is dependent upon the defunctionalization species and associate solvent. Defunctionalization may be possible at room temperature. It is expected that solvent is thermally stable. WO '812 discloses solvents acetonitrile solution (Example 1 page 5).

Regarding **claim 4**, WO '812 discloses solvent dichlorobenzene (Page 8).

Regarding **claim 5**, WO '812 discloses the synthesis of compound 10 (Page 7) where the suspension is completely enclosed in a vessel.

Regarding **claim 6**, WO '812 discloses dispersing the derivatized carbon nanotubes in a polymer (Claim 97).

Regarding **claim 8**, WO '812 discloses defunctionalized product unfuctionalized carbon nanotubes consisting of removed moieties (unfunctionalized) from the derivatized (functionalized) carbon nano tubes (Claim 28).

Regarding **claim 10**, WO '812 discloses defunctionalized product as functional moieties removed carbon nano tubes that were functionalized (Claims 28, 29) in a solvent.

Regarding **claim 12**, WO '812 discloses dispersing the derivatized carbon nano tubes in a polymer (Claim 97) host, functional groups are chemically bound to the polymer host (Claim 99), functional groups are chemically not bound to the polymer host (Claim 100) and thermally defunctionalization after the dispersing step (Claim 101) by heating the derivatized carbon nanotubes (Claim 102) in the polymer host.

Regarding **claim 13**, WO '812 discloses carbon nanotubes are single wall carbon nano tubes (Claim 98).

Regarding **claim 14**, WO '812 discloses defunctionalized product unfuctionalized carbon nanotubes consisting of removed moieties (unfunctionalized) from the derivatized (functionalized) carbon nano tubes in a polymer host and defunctionalized (Claim 101) producing unfunctionalized carbon nano tubes.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO '812 in view of Panhuis et al (Characterization of an Interaction, Journal of Nanoscience and Technology, 2003, Vol 3 No. 3 pages 209 to 213) (hereafter Panhuis '209).

Regarding **Claim 7**, teachings of WO '812 have been described in detail above.

WO '812 does not explicitly teach the application of a surfactant in the dispersion of carbon nano tubes suspended in a solvent.

Panhuis '209 teaches the application of a surfactant triton X-100 (Abstract and Page 212).

At the time of invention it would have been obvious to a person of ordinary skill to use a surfactant in the dispersion of carbon nano tubes in a solvent. The suggestion or motivation for doing so would have been to change the surface state of a nano tube from being completely hydrophilic to completely hydrophobic by carefully selecting a surfactant. Correct surface state of a nano tube being fully or partial hydrophilic to fully of partial hydrophobic determines its suspension in the solvent wherein the nanotubes is to be functionalized or defunctionalized.

Regarding **claim 9**, Teachings of WO '812 have been described in details above.

Further, WO '812 discloses carbon nanotubes defunctionalization wherein the nanotubes are in the polymer in an attached and un-attached state in the temperature range of 250°C to 600°C (Claims 27 to 31 and 98 to 103). Since defunctionalization is not selective, and defunctionalization follows functionalization, it is expected the nanotube after defunctionalization is functionally uniform (MPEP 2144 [R-6]-IV C).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO '812 in view of Iijima et al (Nature, Vol 363, 1993, 603-605) (hereafter Nature '603).

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Regarding **Claim 11**, teachings of WO '812 have been described in detail above.

WO '812 does not explicitly teach the structure of a nano tube in a two dimensional notation.

Nature '603 teaches the orientation of the nano tube represented by an index (m, n) (Figure 3a page 604).

At the time of invention it would have been obvious to a person of ordinary skill to carry out the defunctionalization of nano tubes wherein the nanotubes are characterized by (n, m) notation as suggested by Nature '603. The electronic properties and functionality depends upon (n, m) combination. A prior knowledge of vectors (n, m) is expected to selectively defunctionalize the nano tubes.

Summary

The claims **1-14** are pending and have been examined.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BIJAY SAHA whose telephone number is (571)270-5781. The examiner can normally be reached on Monday- Friday 8:00 a.m. EST - 5:00 p.m. EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571 272 0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BIJAY SAHA/
Examiner, Art Unit 4181
11/26/2008
/Vickie Kim/
Supervisory Patent Examiner, Art Unit 4181